

b) the molar ratio of compound II to compound I is less than 2 when compound I is trifunctional;

c) the amounts of units derived from all carboxylic acids and amines in the polyamide satisfy formula

$$P < 1 / [(F_A - 1) (F_B - 1)] \quad (1)$$

where

$$P = [\sum (n_i f_i)]_X / [\sum (n_i f_i)]_Y \quad (2)$$

where  $P \leq 1$  and either  $X = A$  and  $Y = B$ , or  $X = B$  and  $Y = A$ , and

$$F_X = \sum (n_i f_i^2) / \sum (n_i f_i) \quad (3)$$

for, respectively, all carboxylic acids ( $X = A$ ) and all amines ( $X = B$ ), where  $f_i$  is the functionality of either the carboxylic acid ( $f_i = v_i$ ) or amine ( $f_i = w_i$ ),  $n_i$  being the number of moles of the carboxylic acid or amine and the summation involving all units derived from carboxylic acids and amines in the polyamide.

2. (Cancelled)

3. (Previously Amended): The polyamide according to claim 1, wherein the functionality of compound I is 2.

4. (Original): The polyamide according to claim 3, wherein at least a unit derived from monofunctional carboxylic acid or amine is present.

5. (Previously Amended): The polyamide according to claim 3, wherein compound I is terephthalic acid or 1, 6-hexamethylene diamine.

6. (Previously Amended): The polyamide according to claim 3, wherein compound II is 1, 3, 5-tris (caproic acid) – melamine, trimesic acid or bis (hexamethylene triamine).

*7.* (Original): The polyamide according to claim 1 wherein the AB monomer is an  $\alpha$ ,  $\omega$  - amino acid and/or a lactam.

*8.* (Previously Amended): The polyamide according to claim *7*, wherein the lactam is  $\delta$ -caprolactam.

*9.* (Previously Amended): A process for the preparation of a polyamide film comprising forming a film from a polyamide according to claim 1.

*10.* (Previously Amended): A fiber, film, foam or molded article formed from polyamide according to claim 1.

*11.* (Previously Amended): A film formed from a polyamide according to claim 1.

*12.* (Previously added): A process for preparing intrinsically gel-free, randomly branched polyamides comprising:

A. selecting:

i) at least one AB monomer having both a carboxylic group (A) and an amine group (B);

ii) at least one compound I, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 2$  or an amine ( $B_w$ ) having a functionality  $w \geq 2$ ;

iii) at least one compound II, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 3$  or an amine ( $B_w$ ) having a functionality  $w \geq 3$ , compound II being a carboxylic acid if compound I is an amine or compound II being an amine if compound I is a carboxylic acid;

B. determining the ratio of units derived from all carboxylic acids and amines in the polyamide using the following formula

$$P < 1 / [(F_A - 1) (F_B - 1)] \quad (1)$$

where

$$P = [\sum (n_i f_i)]_X / [\sum (n_i f_i)]_Y \quad (2)$$

where  $P \leq 1$  and either  $X = A$  and  $Y = B$ , or  $X = B$  and  $Y = A$ , and

$$F_x = \sum (n_i f_i^2) / \sum (n_i f_i) \quad (3)$$

for, respectively, all carboxylic acids ( $X = A$ ) and all amines ( $X = B$ ), where  $f_i$  is the functionality of either the carboxylic acid ( $f_i = v_i$ ) or amine ( $f_i = w_i$ ),  $n_i$  being the number of moles of the carboxylic acid or amine and the summation involving all units derived from carboxylic acids and amines in the polyamide; and

C. polymerizing said at least one AB monomer, said at least one compound I and said at least one compound II in the ratio determined by step B to form an intrinsically gel-free polymer.

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13. (Previously Added): The process of claim 12, wherein

- the ratio of compound II to compound I is less than 1 where compound II is trifunctional and compound I is bifunctional; or
- the ratio of compound II to compound I is less than 2 when both compound I and compound II are trifunctional.

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14. (Previously Added): The process of claim 12 wherein the process is continuous.

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15. (Previously Added): The process of claim 13 wherein the process is continuous.

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16. (Currently Amended): A process for preparing intrinsically gel-free, randomly branched polyamides comprising:

A. selecting:

- at least one AB monomer having both a carboxylic group (A) and an amine group (B);
- at least one compound I, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 2$  or an amine ( $B_w$ ) having a functionality  $w \geq 2$ ;
- at least one compound II, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 3$  or an amine ( $B_w$ ) having a functionality  $w \geq 3$ , compound II being a carboxylic acid if

compound I is an amine or compound II being an amine if compound I is carboxylic acid; and

iv) optionally, at least one compound III, being a monofunctional carboxylic acid or a monofunctional amine;

B. determining the amounts ratio of units derived from all carboxylic acids and amines in the polyamide according to ~~any one of the compositions defined by the non shaded regions depicted in figures 1 through 8 using the following formula~~

$$P < 1 / [(F_A - 1) (F_B - 1)] \quad (1)$$

where

$$P = [\sum (n_i f_i)]_X / [\sum (n_i f_i)]_Y \quad (2)$$

where  $P \leq 1$  and either  $X = A$  and  $Y = B$ , or  $X = B$  and  $Y = A$ , and

$$F_X = \sum (n_i f_i^2) / \sum (n_i f_i) \quad (3)$$

for, respectively, all carboxylic acids ( $X = A$ ) and all amines ( $X = B$ ), where  $f_i$  is the functionality of either the carboxylic acid ( $f_i = v_i$ ) or amine ( $f_i = w_i$ ),  $n_i$  being the number of moles of the carboxylic acid or amine and the summation involving all units derived from carboxylic acids and amines in the polyamide; and

C. polymerizing said monomers in the amounts determined in step B ~~at least one AB monomer, said at least one compound I, and said at least one compound II, and optional said at least one compound III~~ to form an intrinsically gel-free randomly branched polyamide.

17.

(Currently amended):

The process of claim 16, wherein

- the ratio of compound II to compound I is less than 1 where compound II is trifunctional and compound I is bifunctional;
- the ratio of compound II to compound I is less than 2 when both compound I and compound II are trifunctional.

18.

(Previously added):

The process of claim 16 wherein the process is

continuous.

*19.* (Previously added): The process of claim *17* wherein the process is continuous.

20. (Canceled)

21. (Canceled)

22. (Canceled)

*23.* (Previously added): Intrinsically gel-free, randomly branched polyamide comprising at least units derived from:

AB monomers, which monomers have both a carboxylic group (A) and an amine group (B);

at least one compound I, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 2$  or an amine ( $B_w$ ) having a functionality  $w \geq 2$ ;

at least one compound II, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 3$  or an amine ( $B_w$ ) having a functionality  $w \geq 3$ , compound II being a carboxylic acid if compound I is an amine or compound II being an amine if compound I is a carboxylic acid,

wherein at least one of compounds I and II comprises a carboxylic acid ( $A_v$ ) or an amine ( $B_w$ ) having a functionality  $v$  or  $w$  chosen from 4, 5, or 6 and the amounts of units derived from all carboxylic acids and amines in the polyamide satisfy the following formula:

$$P < 1 / [(F_A - 1).(F_B - 1)] \quad (1)$$

where:

$$P = [\sum (n_i.f_i)]_X / [\sum (n_i.f_i)]_Y \quad (2)$$

where  $P \leq 1$  and either  $X = A$  and  $Y = B$ , or  $X = B$  and  $Y = A$ , and

$$F_x = \sum (n_i \cdot f_i^2) / \sum (n_i \cdot f_i) \quad (3)$$

for, respectively, all carboxylic acids ( $X = A$ ) and all amines ( $X = B$ ), where  $f_i$  is the functionality of either the carboxylic acid ( $f_i = v_i$ ) or amine ( $f_i = w_i$ ),  $n_i$  being the number of moles of the carboxylic acid or amine and the summation involving all units derived from carboxylic acids and amines in the polyamide.

24. (Previously added): Intrinsically gel-free, randomly branched polyamide comprising at least units derived from:

AB monomers, which monomers have both a carboxylic group (A) and an amine group (B);

at least one compound I, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 2$  or an amine ( $B_w$ ) having a functionality  $w \geq 2$ ;

at least one compound II, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 3$  or an amine ( $B_w$ ) having a functionality  $w \geq 3$ , compound II being a carboxylic acid if compound I is an amine or compound II being an amine if compound I is a carboxylic acid;

optionally, at least one compound III, being a monofunctional carboxylic acid or a monofunctional amine;

wherein at least one of compounds I and II comprises a carboxylic acid ( $A_v$ ) or an amine ( $B_w$ ) having a functionality  $v$  or  $w$  chosen from 4, 5, or 6.

*25.* (Currently Amended): The polyamide of claim *24*, wherein said compound I is difunctional, and compound II is tetrafunctional and the ratio of all carboxylic acids and amines in the polyamide are determined by the non shaded regions of figure 3.

*26.* (Currently Amended): The polyamide of claim *24*, wherein said compound I is trifunctional, and compound II is tetrafunctional and the ratio of all carboxylic acids and amines in the polyamide are determined by the non shaded regions of figure 4.

*27.* (Currently Amended): The polyamide of claim *24*, wherein said compound I is difunctional, and compound II is pentafunctional and the ratio of all carboxylic acids and amines in the polyamide are determined by the non shaded regions of figure 5.

*28.* (Currently Amended): The polyamide of claim *24*, wherein said compound I is trifunctional, and compound II is pentafunctional and the ratio of all carboxylic acids and amines in the polyamide are determined by the non shaded regions of figure 6.

*29.* (Currently Amended): The polyamide of claim *24*, wherein said compound I is difunctional, and compound II is hexafunctional and the ratio of all carboxylic acids and amines in the polyamide are determined by the non shaded regions of figure 7.

*30.* (Currently Amended): The polyamide of claim *24*, wherein said compound I is trifunctional, and compound II is hexafunctional and the ratio of all carboxylic acids and amines in the polyamide are determined by the non shaded regions of figure 8.